

### **The Title**

The Examiner asserted that the title is not descriptive. In response, the title has been change to "SEMICONDUCTOR DEVICE WITH INTERCONNECTION LAYER".

**Claims 1, 2, 4 through 7, 9 and 10 were rejected under 35 U.S.C. §103 for obviousness predicated upon Merchant et al.**

In the statement of the rejection, the Examiner referred to Figs. 1 through 7 of Merchant et al., focusing on the recess depicted in Fig. 5. The Examiner **admitted** that Merchant et al. do not disclose that the recess is caused by a crystal grain boundary. Nevertheless, the Examiner concluded that one having ordinary skill in the art would have recognized that the recess is caused by a crystal grain boundary based upon column 4 of Merchant et al., lines 54 and 55, 62 through 64 and in column 3, lines 52 through 54. This rejection is traversed.

### **There is no Inherency**

Independent claim 1 specifies, that the recess is caused by a crystal grain boundary. The Examiner says that such is present in the device depicted in Fig. 5 of Merchant et al. and says it would have been recognized by one having ordinary skill in the art. However, the excerpts from the specification identified by the Examiner do **not**

support the Examiner's determination. Moreover, there is a factual basis which undermines the Examiner's determination.

Initially, Applicants would stress that in order to establish inherency, the Examiner must provide a **factual** basis upon which to support the determinations that an allegedly inherent feature **necessarily** flows from the teachings of the applied prior art and would have been **recognized** by one having ordinary skill in the art. *Elan Pharmaceuticals Inc. v. Mayo Foundation*, \_\_\_ F.3d \_\_\_, 64 USPQ2d 1292 (Fed. Cir. 2002); *Crown Operations International Ltd. v. Solutia Inc.*, 289 F.3d 1367, 62 USPQ2d 1917 (Fed. Cir. 2002). That burden has not been discharged.

Moreover, there is a **factual** basis of record upon which to undermine the Examiner's inherency notion. Specifically, it is apparent one having ordinary skill in art would have recognized that the recess illustrated in Fig. 5 is manifestly formed **because** the depositing metal flows into the opening, as disclosed in column 5, lines 12 et. seq. Accordingly, the Examiner's assertion that the recess is formed by a crystal grain boundary is **factually erroneous**. In addition, the Examiner's assertion that one having ordinary skill in the art would recognize that the recess formed by a crystal grain boundary is factual erroneous.

At any rate, claim 1 has been amended by incorporating the limitations of claim 2 therein and reciting that the first conductive layer has a substantially planar surface and the recess is formed directly over the substantially upper planar surface. This feature is neither disclosed nor suggested by Merchant et al. Indeed, the recess is formed because metal is deposited over an opening-- not a planar surface.

### Independent Claim 6

In rejecting claim 6, the Examiner asserted one having ordinary skill in the art would have found it obvious to arrive at the claimed invention "by routine experimentation." The Examiner's approach is factually and legally erroneous.

Firstly, in rejecting claim 6, the Examiner failed to comply with the mandate of the Court of Appeals for the Federal Circuit to make a "thorough and searching" factual inquiry and, based upon that factual inquiry, explain **why** one having ordinary skill in the art would have been realistically impelled to modify the particular semiconductor device disclosed by Merchants et al. to arrive at the claimed invention. *In re Lee*, 237 F.3d 1338, 61 USPQ2d 1430,1433 (Fed. Cir. 2002). Indeed, the Examiner has **not factually established** the requisite motivation for modifying the third conductive layer 16.3 of the device disclosed by Merchant et al. such that it exhibits an average grain size smaller than that of the second conductive layer 16.3. Merely because the third conductive layer 16.3 has a relatively large grain size **depending on a dimension of a plug**, does **not** mean that one having ordinary skill in the art would have been realistically motivated to form the third conductive layer 16.3 with an average grain size less than the average grain size of the layer immediately thereunder. There is **no factual** basis to support this conclusion. The Examiner's "routine experimentation" rubric is legally erroneous because it is squarely in conflict with the ultimate sentence of 35 U.S.C. §103(a) which states "Patentability shall not be negated by the manner in which the invention was made." *Merck & Co. Inc. v. Biocraft Laboratories, Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir. 1989); *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986); *In*

*re Saether*, 492 F.2d 849, 181 USPQ 36 (CCPA 1974); *In re May*, 172 F.2d 593, 80 USPQ 515 (CCPA 1949).

It should, therefore, be apparent that a prima facie basis to deny patentability to the claimed invention has not been established. Applicants, therefore, submit that the imposed rejection of claims 1, 2, 4 through 7, 9 and 10 under 35 U.S.C. §103 for obviousness predicated upon Merchant et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

**Claims 3 and 8 were rejected under 35 U.S.C. §103 for obviousness predicated upon Merchant et al. in view of the acknowledged prior art.**

This rejection is traversed. Specifically, claim 3 depends from claim 1 and claim 8 depends from claim 6. Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claims 1 and 6 under 35 U.S.C. §103 for obviousness predicated upon Merchant et al. The Examiner's reliance upon the acknowledged prior art does not cure the above argued deficiencies of Merchant et al.

Applicants, therefore, submit that the imposed rejection of claims 3 and 8 under 35 U.S.C. §103 for obviousness predicated upon Merchant et al. in view of the acknowledged prior art is not factually or legally viable and, hence, solicit withdrawal thereof.

**Claim 1 was rejected under 35 U.S.C. §103 for obviousness predicated upon Arao et al. in view of Iwasaki et al.**

This rejection is traversed. Indeed, this rejection has been rendered moot by incorporating the limitations of claim 2 into claim 1, claim 2 not being subject to this rejection.

Applicants, therefore, submit that the imposed rejection of claim 1 under 35 U.S.C. §103 for obviousness predicated upon Arao et al. in view of Iwasaki et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Accordingly, favorable consideration is, solicited.

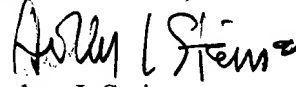
To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any

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excess fees to such deposit account.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Arthur J. Steiner", written over the printed name.

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APPENDIX

IN THE TITLE:

The new title read as follows -- SEMICONDUCTOR DEVICE WITH

C1 INTERCONNECTION LAYER--.

IN THE CLAIMS:

Claim 1 now reads as follows.

1. (Amended) A semiconductor device, comprising:

C2 a semiconductor substrate; and

a conductive layer formed on said semiconductor substrate and including

polycrystals, said conductive layer including in its surface a recess caused by a crystal grain boundary and having side walls formed such that a distance therebetween becomes small as closer to said semiconductor substrate, wherein said conductive layer includes:

a first conductive layer having a substantially planar upper surface, formed on said semiconductor substrate and including a polycrystal having a first average grain size;

a second conductive layer formed on said first conductive layer, including a polycrystal having a second average grain size greater than said first average grain size and having said recess; and

said recess is formed directly over the substantially planar upper surface of the first conductive layer.

Claim 2 has been cancelled.